6.5 Appendix V: IMPLAN Modeling Approach

The IMPLAN system consists of software and data that may be purchased from the Minnesota IMPLAN Group. The software provides the mathematical algorithms to estimate input-output models, as well as a user-friendly interface for customizing input-output models to an application. Default data sets available for purchase include county-level data on the economic characteristics of 440 distinct business sectors for every county in the U.S. County-level data sets for each coastal state in the Northeast, from Maine to North Carolina, were acquired to construct the input-output model.

Unfortunately, the operation of charter fishing boats is included in an all encompassing Scenic and Sightseeing Transportation sector that includes all land, air, and water-related transportation businesses. Therefore, the underlying economic data contained in IMPLAN characterizes the aggregate activity of many businesses and will not accurately portray the operation of charter fishing boats in the Northeast. To more accurately characterize the actual operation of for-hire businesses, total charter and head boat gross revenues, expenses, and net returns, estimated from the survey data (see Table 14), were used in conjunction with IMPLAN multipliers to calculate the regionwide multiplier effects attributed to the for-hire fleet in the Northeast.

Questions concerning products and services purchased from businesses located in the Northeast versus those purchased from businesses located outside the region were not included on the survey. Purchases from businesses located outside of the Northeast impact the economies of other regions and should be excluded from the contribution assessment. Fortunately, the IMPLAN system contains regional purchase coefficients (RPCs), which can be used to estimate the portion of the total regional demand supplied by regional producers. By incorporating IMPLAN's RPCs for all commodity-based transactions, we were able to estimate the amount of each purchase that was supplied by businesses located in the Northeast.[8]

IMPLAN margins were used to convert retail-level prices paid by for-hire owners into appropriate producer values. Margins ensure that correct values are assigned to products (i.e., commodities) as they move from producers, to wholesalers, through transportation sectors, and finally on to retail establishments.

For-hire revenue obtained from both nonresidents and residents of the Northeast were used in the assessment. However, spending by residents of the Northeast on recreation-related activities is part of household consumption and is endogenous in the input-output model. Therefore, to avoid double-counting in the input-output model, the total value of for-hire gross revenue obtained from residents of the Northeast was subtracted from IMPLAN prior to constructing the input-output model. Using this procedure, the contribution of revenue received from resident for-hire passengers can be considered exogenous and was modeled in the same manner as the revenue received from nonresident passengers.[9]

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[8]IMPLAN's default RPC values associated with the supply of bait (frozen fish, squid, sea worms, clams, live eels, etc.) from local fishermen and wholesalers was increased to one, since virtually all locally purchased bait comes from harvesters and dealers operating in the Northeast.

[9]Inclusion of the passenger fees received from both nonresidents and residents is necessary to show the total contribution of the for-hire industry to the Northeast's economy. Failure to include the revenue received from residents would underestimate the contribution of the for-hire fleet. Contribution-type input-output assessments are often confused with economic impact input-output assessments, where resident expenditures are usually excluded. Further clarification of the differences can be found in Watson et. al. 2007.

6.5.1 For-Hire Fleet Operating Expenditures

The full list of individual expense items that were applied to the IMPLAN-generated multipliers is shown in Table A21. Several of the expense items warrant further clarification. The cost of supplies was apportioned evenly across four IMPLAN sectors that manufacture soaps, brooms, mops, clothes (e.g., uniforms) and plastic bags. These were the items that for-hire owners most commonly listed as "other supplies" on the survey. A detailed breakdown of food and drink expenditures was not requested on the survey instrument, so this cost was assigned to IMPLAN sectors according to the Personal Consumption Expenditure (PCE) activity data base for grocery store purchases created by the Bureau of Economic Analysis. This PCE vector is available in IMPLAN and represents the national average expenditure pattern by households for groceries. The total cost of state fishing permits, as well as the cost of obtaining professional certificates, was assigned to IMPLAN sectors according to the state/local government noneducation institution spending pattern available in IMPLAN. This spending pattern represents the regionwide average expenditure pattern by state/local government institutions, not involved in education-related activities, and includes goods and services purchased as well as wages and salaries paid to government employees. The total cost of federal fishing permits was assigned to the federal government nondefense institution spending pattern contained in IMPLAN.[10]

[10]Three other expenditure categories were adjusted further prior to generating impacts. A large portion of payments for property insurance and interest on loans generate no economic impacts in an input-output model. The sales of most industries in an input-output model are expressed in terms of business receipts, but the insurance carrier and the banking sectors are measured on a net basis. The output of the insurance carrier sector is calculated by subtracting claims and policy dividends paid from premiums earned. The output of the banking sector includes interest payments on loans, but also many other income-generating activities, and takes into account the interest paid by banks on depositors' funds and for bank services where no explicit charges are made. Therefore, if the total estimated value of the property insurance and interest payments made by for-hire vessel owners were applied to the input-output model's multipliers, the impact on the local economy would be overstated. To provide net expenditure estimates that would equate to the values contained within IMPLAN, the insurance expenditure estimate was adjusted by the average net profit margin percentage for property and casualty insurance firms in the Northeast (7.2%), and the average net profit margin percentage for the banking industry in the Northeast was used to adjust expenditures on bank fees and interest payments (15.3%; http://biz.yahoo.com/p/).

Table A21. Charter and head boat IMPLAN sectoring scheme

Expenditure/Income Category	IMPLAN sector(s)	IMPLAN description
Fuel and oil	3115	Refined petroleum products
Bait	3017	Fish (squid, clams, etc.)
Ice	3070	Soft drinks and manufactured ice
Food & drink	PCE , NIPA1111	IMPLAN PCE vector for grocery store purchases
Tackle & supplies		
Fishing gear and tackle	3311	Sporting and athletic goods
Other supplies	3138, 3318, 3086, 3142	Soaps, brooms, mops, knit apparel, plastics
Repair & maintenance		
By boatyard	418	Personal and household goods repair and maintenance
By staff	320	Retail stores - motor vehicle and parts (boat parts)
Insurance	357	Insurance carriers
Overhead		
Office staff	5001	Employee compensation
State fishing permits	State govt	State/local govt noneduction institution spending pattern
Federal fishing permits	Federal govt	Federal govt nondefense institution spending pattern
Fishing association dues	425	Civic, social, professional, and similar organizations
Professional certifications	State govt	State/local govt noneduction institution spending pattern
Accounting / book keeping	368	Accounting, tax preparation, bookkeeping, and payroll
Bank fees	354	Monetary authorities
Legal fees	367	Legal services
Advertising & promotion	377	Advertising and related services
Booking agent fees	383	Travel arrangement and reservation services
Dock/slip fees	409	Amusement parks, arcades, and gambling industries (marinas)
Telephone & internet	351	Telecommunications
Electric & other utilities	31	Electric power generation, transmission, and distribution
Weather service subscriptions	380	Miscellaneous professional, scientific, and technical services
Company vehicle lease	355	Nondepository credit intermediation and related activities
Company vehicle maintenance	414	Automotive repair and maintenance
Hired captain	5001	Employee compensation
Crew / mates	5001	Employee compensation
Investments		
Electronics	3249	Search, detection, and navigation instruments
Loan payments		
Principal	291	Boat building
Interest	354	Monetary authorities
Owner net returns		
Head boat owners	10008	Households 100-150K
Charter boat owners	10003	Households 15-25K

6.5.2 Disposable Income Spending by Owners, Hired Captains, Crew/Mates, and Office Staff

Calculation of "induced" impacts required making assumptions about the goods and services purchased and the levels of disposable income available for spending. The IMPLAN system contains a PCE activity database that represents the national average expenditure pattern for disposable income according to nine different annual household income classes. Each of the nine household income PCE vectors show the average proportion of goods and services that will be purchased from a given IMPLAN sector for each dollar of spending. Spending patterns differ dramatically between income levels. Low-income spending is more heavily weighted toward necessities (i.e., food, clothing, shelter), while higher-income levels provide more disposable income for recreation and luxury spending. In absence of a primary expenditure survey that identifies the specific spending patterns of for-hire vessel owners, hired captains, crew/mates, and office staff, the nine IMPLAN PCE vectors provide a reasonable approximation of the goods and services that are purchased with the income earned from for-hire activities.

The regional contribution of income expenditures to the Northeast's economy were estimated separately for vessel owners, captains, crew/mates, and office staff, to account for differences in spending across income levels. The average net return, per vessel, for head boat owners in 2010, was approximately $95.2 thousand. Many head boat owners earned additional income from other activities though. Survey data indicated that the average head boat owner derived approximately 70% of his/her total income from for-hire activities in 2010. Therefore, it can be assumed that the average head boat owner earned a total of just over $135 thousand (95/0.7=135.7) in 2010 from all income-generating activities. While the contributions of non for-hire earnings to the Northeast's economy are excluded from this study, the additional income earned by head boat owners had an effect on which PCE profile was chosen to best represent the overall spending pattern of head boat owners. Ultimately, head boat owners were assumed to spend their income according to the spending pattern represented by households with earnings of $100-$150 thousand in 2010.[11]

Charter boat net returns were assumed to have been spent according to the spending pattern represented by households with earnings of $25-$35 thousand. Net earnings per charter vessel averaged $5,175, but charter owners indicated that only 17% of their total income, on average, in 2010 was derived from charter activities. Thus, total earnings from all income-generating activities in 2010 was calculated at approximately $30.8 thousand (5,175/0.168=30,804), and it was assumed that charter owners would spend their disposable income according to the spending pattern represented by households with incomes that range from $25-$35 thousand.[12]

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[11] The Household Income Change option was employed in IMPLAN to estimate the multiplier effects of the earnings by head boat owners in 2010. This option correctly removes personal taxes and savings, based on regional average rates, before calculating the contribution of disposable income expenditures to the economy.

[12] Income earned by spouses also contributes to the income base of households and may raise the level of disposable income available for spending. The average level of spousal earnings are unknown, however, so the PCE profile chosen for the analysis is based on personal earnings and not actual household earnings. Additionally, as indicated in Section 4.2, we consider our estimate of average charter net earnings to be a lower bound approximation of earnings. For these reasons, the average household income of charter owners was likely higher than $25-$35 thousand.

Hired captains, crew/mates, and office staff earnings, were assumed to be spent according to the average spending pattern across all Northeast households contained in IMPLAN (IMPLAN sector 5001, employee compensation). Because of the seasonal nature of the for-hire business in the Northeast, a substantial number of individuals employed by head boat and charter boat owners in the Northeast are likely employed in other industries during the offseason. The survey we conducted was administered to for-hire owners, and not hired employees, so we were unable to determine total annual income levels for hired employees. In the absence of this information, the employee compensation vector provides a reasonable approximation of the goods and services purchased by hired captains, crew/mates, and office staff employed by both head boat and charter boat owners in 2010.